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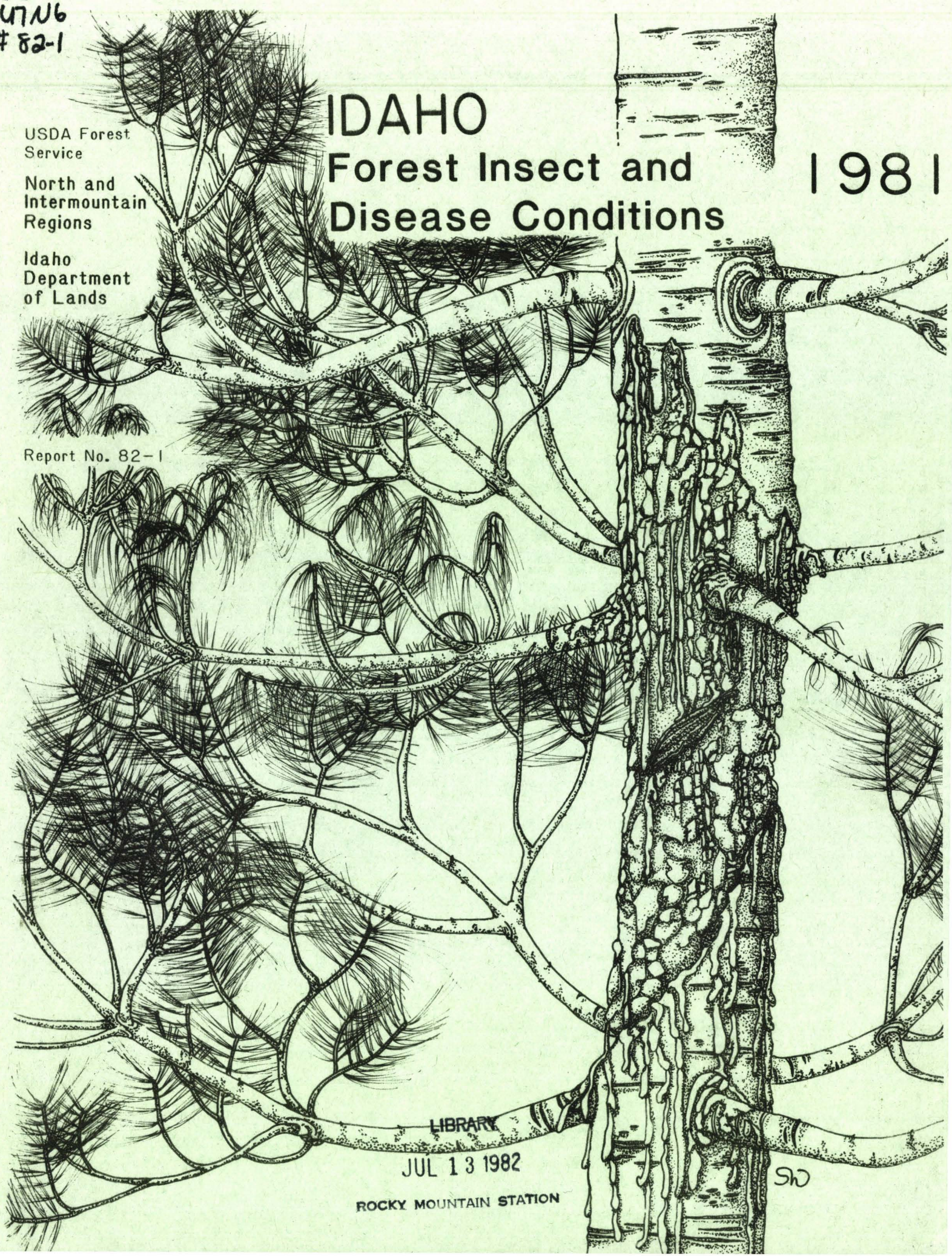
IDAHO
Forest Insect and Disease Conditions
1981

USDA Forest Service

North and Intermountain Regions

Idaho Department of Lands

Report No. 82-1



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FOREST INSECT AND DISEASE CONDITIONS IN IDAHO

1981

by

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Report No. 82-1
January 1982

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INTRODUCTION

This report summarizes the results of aerial and ground surveys conducted in 1981 by the Idaho Department of Lands and the USDA-Forest Service, Northern and Intermountain Regions, to detect and monitor forest insect and disease outbreaks or problems in Idaho. Major insect damage on forested lands of all ownerships within the State are outlined on maps and tables in the Appendix of this report. Larch foliage problems were not delineated on the maps this year because these problems were evident throughout the entire range of larch in Idaho. White pine blister rust distribution was also omitted from the maps this year because it does not significantly change from year to year.

Due to the difficulty of making accurate tree mortality estimates while flying aerial surveys, these values should not be taken as exact measurements of damage. Previous comparisons of aerial survey data with ground check plots have shown that estimates of numbers of trees killed are consistently low. However, the location and trends of damage from year to year can be accurately shown by the maps and by comparison of yearly counts.

Cause of tree damage cannot always be accurately assessed from the air. Because only limited ground checking occurred in 1981, causes of mortality are based largely on ground survey results from prior years and long-term observations in the area.

CONDITIONS IN BRIEF

Bark beetle damage generally decreased throughout the State. Major declines in mountain pine beetle activity occurred in lodgepole pine stands of eastern Idaho. The smaller mountain pine beetle outbreaks in northern Idaho continued to cause heavy localized damage while the outbreak south of Lewiston increased in intensity and began spreading north and west. Fir engraver beetle activity was much reduced with approximately 75 percent fewer dead trees than in 1980. Douglas-fir beetle attacks in southern Idaho were generally lower than in 1980. However, there were several centers of increased activity in northern Idaho. Pine engraver activity was very low throughout the State with most attacks being found near Coeur d'Alene. Spruce beetle activity occurred in the northern portion of the State for the first time in many years.

Foliage insect activity remained generally static; however, defoliation caused by several insects not reported in 1980 was observed this year. Total acreage of western spruce budworm defoliation in southern Idaho remained relatively constant. However, acreage of the various defoliation severity classes varied from last year. Western spruce budworm activity in northern Idaho was minimal, being confined to several localized areas on the western edge of the Clearwater National Forest. Several Douglas-fir tussock moths were caught in pheromone traps in northern Idaho

and defoliation occurred over 160 acres in the Owyhee Mountains southwest of Boise where large numbers of moths were trapped in 1980. This may indicate a potential population buildup. The pine butterfly was discovered in the Boise and Payette National Forests where moderate defoliation of ponderosa pine occurred west of Banks. No defoliation caused by the new budworm was found in the mountains north of Wallace. This insect has apparently declined to very low levels. Larch casebearer damage was widespread throughout the State although heavy infections by needle pathogens made detection of this damage difficult.

Prolonged cool, moist weather during the spring of 1981 created ideal conditions for foliage diseases. As a result, the prevalence of foliage diseases observed in 1980 continued to increase. Needle diseases and casebearer caused extensive discoloration and defoliation of western larch throughout its natural range in Idaho. Red band needle blight of ponderosa pine was common on portions of the Clearwater National Forest in northern Idaho and was identified for the first time in southern Idaho. Lophodermium needle cast was severe on Scotch pine Christmas trees near Sandpoint. Many poplar species were severely defoliated by leaf pathogens.

Root diseases cause severe losses throughout the State, especially within mixed conifer stands in the north. These diseases are often closely associated with bark beetle activity, especially on true fir and Douglas-fir. Trees weakened by root disease become prime targets for bark beetles and can be an underlying cause for beetle outbreaks. Surveys indicate that root diseases are associated with the death of about 760,000 trees on the Nezperce National Forest each year.

Dwarf mistletoes are common throughout the State, but are of primary concern in southern Idaho forests. White pine blister rust continues to cause extensive mortality in many northern Idaho stands.

INSECTS

BARK BEETLES

Mountain Pine Beetle

The mountain pine beetle was the most serious bark beetle pest in Idaho. A general downward trend has occurred for the entire State since 1979. The overall decline was largely due to a reduction of the infestation in eastern Idaho on the Targhee Naional Forest and adjacent State and private lands. In that area, most susceptible trees have already been killed and the insect is being forced into less hospitable sites resulting in a decline of the outbreak.

Southeastern Idaho

For the first time in several years, the massive mountain pine beetle outbreak on the Targhee National Forest declined dramatically. In 1981 an estimated 714,000 lodgepole pine were killed as opposed to approximately 4 million trees that succumbed in 1980. Old infestations on the

Ashton and Island Park Ranger Districts continued to subside. Buildups on the Teton Basin Ranger District stabilized.

Most noticeable areas of tree mortality were on south slopes of the Centennial Mountains, Dubois Ranger District.

South-central Idaho

Chronic infestations of mountain pine beetle in lodgepole pine continued downward trends on the northern portion of the Sawtooth National Forest from Galena Summit southward to and west of Ketchum. The epidemic in the upper reaches of the South Fork of the Boise River has apparently run its course. On the southern portion of the Forest, activity was negligible on the Twin Falls and Burley Ranger Districts. Declining trends are evidenced by estimated numbers of trees killed: approximately 19,000 in 1980 compared to 3,000 in 1981.

Southwestern Idaho

Downward trends in mountain pine beetle activity continued on the Boise National Forest where numbers of lodgepole pines killed declined from 37,000 in 1980 to approximately 10,000 in 1981. Most mortality occurred in old infestation areas near Deadwood Reservoir and along the upper reaches, North Fork of the Boise River.

Mountain pine beetle activity also declined on the Payette National Forest although extensive lodgepole pine mortality continued in the Paddy Flat and Kennally Creek areas southeast of McCall. Elsewhere, infestations were static to slightly decreasing. Forest-wide, approximately 30,000 trees were killed as opposed to 37,000 lost in 1980.

On State and private lands between McCall and Cascade, persistent mountain pine beetle infestations have ravaged lodgepole pine stands for 2 decades. Currently, the mortality trend is downward with 7,000 trees lost in 1981 as compared to 14,000 killed in 1980.

Northern Idaho (North of the Salmon River)

In northern Idaho the mountain pine beetle attacks lodgepole pine, ponderosa pine, and western white pine. In lodgepole pine, three areas were heavily attacked: the headwaters of the South Fork of the Clearwater River near Elk City, the Waha area near Soldier's Meadow Reservoir south of Lewiston, and a small area in the Latour Creek drainage south of Cataldo. Near Elk City over 2,000 trees were killed in the Crooked River, South Fork of the Clearwater River, Deadwood Creek and Newsome Creek drainages. This area contains extensive stands of susceptible lodgepole pine and we anticipate that the population will eventually develop to epidemic proportions.

Severe damage occurred in the Soldier's Meadow Reservoir area where an estimated 54,000 trees were killed in 1981. This infestation has

persisted for 5 years; the outbreak has now expanded to the north and west of the reservoir. To the south and east in the area of the original infestation, the host has been depleted and the population is declining. Stand susceptibility ratings were prepared for the general area but complex ownership patterns make management very difficult.

The area south of Cataldo contains few susceptible trees. We anticipate host depletion by the beetles within a few years. The question is, where will the beetle spread from there? Susceptible stands are present from the Rathdrum Prairie north to the Canadian border.

Damage to ponderosa pine was widespread. Small groups of dead trees were scattered from the Canadian border to the Craig Mountains south of the Salmon River. Infestations in western white pine were also scattered throughout northern Idaho. No concentrated areas of activity were located. Actual number of trees killed is probably higher than reported because it is often difficult to separate beetle-killed trees from white pine blister rust trees.

Fir Engraver Beetle

Fir engraver activity was very low during 1981. Even though the distribution map (Appendix) indicates several areas of activity most were small with very few dead trees/acre. Number of dead grand fir trees associated with the fir engraver fluctuates widely from year to year (table 1). During endemic conditions grand fir mortality is usually due to the combined activity of root diseases and the fir engraver.

Table 1.--Number of fir engraver attacked trees in Idaho, 1978-1981.

Year	Number of trees
1978	13,000
1979	6,700
1980	20,900
1981	3,448

Douglas-fir Beetle

Douglas-fir beetle activity continued its general State-wide decline which started in 1978; only 6,925 recently killed trees were found in 1981.

Large scale infestations of Douglas-fir beetle experienced in the late 1960's and early to mid-1970's in southern Idaho continued to decline. Heaviest damage was recorded on the Boise National Forest along the Middle Fork Boise River where approximately 800 trees were killed. On the Weiser Ranger District, Payette National Forest, persistent tree killing occurred in Adams and Stacy Creeks.

The main infestations in northern Idaho were near the junction of the Selway and Lochsa Rivers. High levels of root disease are probably responsible for maintaining this outbreak. Other large outbreaks were found adjacent to the South Fork of the Clearwater River, the headwaters of White Bird Creek, Skookumchuck Creek and Slate Creek. Smaller new infestations were found within the North Fork of the Clearwater River drainage west and south of the town of Elk River and a concentrated outbreak on John Lewis Mountain.

Pine Engraver Beetle

Pine engraver beetle activity was at a very low level State-wide. Activity declined from 34,099 killed trees in 1980 to 2,543 in 1981. Most attacks were in small scattered groups throughout the pine type of northern Idaho. Nearly 60 percent of the attacked trees were found in the Rathdrum Prairie west and north of Coeur d'Alene, and west of Coeur d'Alene Lake. In southern Idaho a few groups of dead trees were found near Cascade and northeast of Boise.

Western Pine Beetle

Only 69 trees recently killed by the western pine beetle were found throughout the State in 1981. Most attacks occurred on large, old, single ponderosa pine. Occasionally this beetle also attacked 80- to 100-year-old pine, killing concentrated groups of trees.

Spruce Beetle

Windthrow of old growth spruce during 1978 and 1979 probably provided breeding material for buildup of spruce beetle populations in the northern tip of Idaho. The Forest Service salvaged large volumes of killed and infested spruce from the Beaver, Cow, and Grass Creek drainages south of the Canadian border during 1980 and 1981. Several groups of fading spruce trees (figure 1) still exist in these drainages and also within Blue Joe, Canuck, and American Creek drainages. To the southwest, near the headwaters of the Priest River, two areas of infested and killed trees were detected within Bugle and Abandon Creek drainages on State land. We suspect there are groups of trees attacked in 1981 throughout these residual stands of old growth spruce and that this infestation will continue to spread.

Western Balsam Bark Beetle

This beetle is a chronic pest in stands of subalpine fir in Idaho. It prefers weakened trees and is probably attracted to root diseased fir. Although only 253 trees were recorded during surveys in northern Idaho, many groups were present throughout fir stands. Drainages along the Canadian border and upper Preist River contained most of the groups in 1981. Damage is also chronic in the mountains of eastern Idaho.

Tree mortality for 1981 associated with bar beetles is summarized in tables 2 and 3.

Table 2.--Approximate number of trees killed by bark beetles - southern Idaho, 1980-1981.

National Forest	Mountain pine beetle	Trend	Douglas-fir beetle	Trend	Ips	Trend	Spruce beetle	Trend
Boise								
1980	54,861	Down	3,126*	Down	5,064*	Down	--	Static
1981	9,111		795		294		--	
Caribou								
1980	7,595*	Down	190	Down	--	Static	--	Up
1981	6,811		158		--		27	
Challis								
1980	30	Up	--	Static	--	Static	--	Static
1981	350		--		--		--	
Payette								
1980	36,713*	Down	1,280*	Down	593	Down	--	Static
1981	29,432		529		--		--	
Salmon								
1980	--	Static	144*	Down	277*	Down	--	Static
1981	--		50		54		--	
Sawtooth								
1980	19,145*	Down	660*	Down	--	Static	--	Static
1981	2,683		157		--		--	
Targhee								
1980	4,100,000*	Down	271	Down	--	NA	--	Static
1981	713,447		100		--		--	
Totals								
1980	4,218,344	Down	5,671	Down	5,934	Down	0	Up
1981	761,834		1,789		348		27	

* Includes adjacent lands other than National Forests

Table 3.--Bark beetle conditions in northern Idaho, 1980-1981.

NATIONAL FOREST [1] or STATE FOREST PROTECTIVE DISTRICT		MOUNTAIN PINE BEETLE		FIR ENGRAVER BEETLE		DOUGLAS-FIR BEETLE		PINE ENGRAVER BEETLE	WESTERN BALSAM BARK BEETLE	
		Trees [2] killed	Volume MBF	Trees [3] killed	Volume MBF	Trees [4] killed	Volume MBF	Trees [5] killed	Volume MBF	Trees [6] killed	Volume MBF
IPNF	1980	3,647	2,131.9	6,121	1,836.3	55	22.0	162			
	1981	522	191.8	699	139.8	277	96.9	45			
Clearwater	1980	178	74.2	1,301	389.1	178	62.4	30		30	
	1981	212	78.1	--	--	224	78.4	73		15	
Nezperce	1980	2,141	178.6	3,627	1,088.1	1,531	612.4	388		815	8.8
	1981	2,814	245.7	114	22.8	2,620	917.0	207		135	
Priest Lake	1980	--	--	95	28.5			80			
	1981	5	400	45	9.0	78	27.3			68	4.4
Pend Oreille	1980	22	1.1	290	87.0	48	14.4	3,391			
	1981	2	.15	186	37.2	144	50.4	285			
Mica	1980	148	7.4	767	230.1	38	15.2	12,498			
	1981	20	1.6	300	60.0	39	13.6	978			
Cataldo	1980	2,011	171.6	547	164.1			56			
	1981	1,211	108.9	65	13.0	40	14.0	27			
West St. Joe	1980	2	160	3,715	1,114.5	345	138.0	5,116			
	1981			909	181.8	81	28.4	428			
Kendrick	1980			1,697	509.1	16		1,011			
	1981			100	20.0	15	5.3	5			
C.P.T.P.A.	1980	42	20.2	2,308	692.4	191	73.2	50			
	1981	289	93.9	855	171.0	1,358	475.3	6			
Craig Mtns.	1980	15,955	1,381.9	261	78.3	213	85.2	4,830			
	1981	54,665	4,919.2	137	27.4	246	86.1	118			
Maggie Cr.	1980	4	1.6	110	33.0	53	15.9	1			
	1981	2	.16	38	7.6	13	4.6	7			
Totals	1980	24,150		20,839		2,668		27,613		845	
	1981	59,742		3,448		5,135		2,179		218	
Net change		+35,592		-17,391		+2,467		-25,434		-627	

1/ All ownerships within National Forest boundaries, or State Forest Protective Districts
2/ Lodgepole, ponderosa, and western white pine
3 Grand fir
4/ Douglas-fir
5/ Ponderosa pine
6/ Subalpine fir

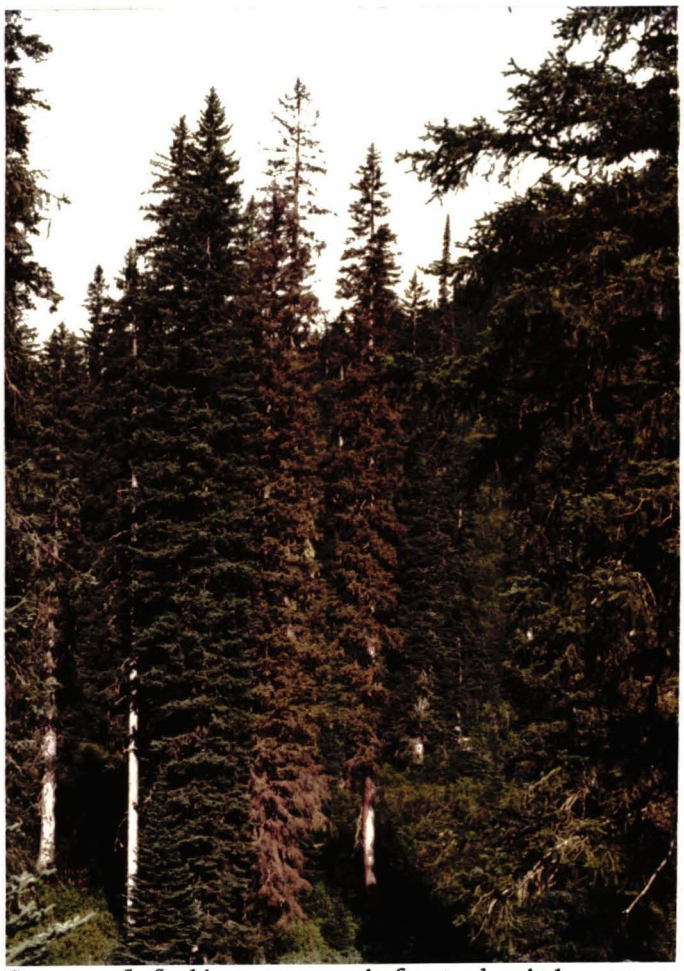

Figure 1.--Group of fading trees infested with spruce beetle.

MAJOR DEFOLIATORS

Western Spruce Budworm

Aerial sketch-map surveys in southern Idaho identified over 1.2 million acres of defoliation during 1981. Table 4 summarizes current defoliation by area but does not include defoliated acreage in the River of No Return and Sawtooth Wilderness areas.

Total defoliated acreage increased in all areas surveyed in southern Idaho with the exception of the Salmon and Targhee National Forests. The overall reduced amount of defoliation was largely due to fewer acres of heavy defoliation. Areas with traditionally heavy defoliation were less impacted. This favorable trend was offset by increased light defoliation in previously uninfested areas.

Table 4.--Areas of visible defoliation by western spruce budworm in southern Idaho during 1980 and 1981 as derived from aerial detection surveys over Federal, State and private forest lands.

Area	Year	Defoliation Intensity: Light		Moderate		Heavy		Total	
Boise NF	1981	165,062	↑*	104,091	↑	34,131	↓	303,284	↑
	1980	110,900		34,300		59,000		204,200	
Caribou NF	1981	34,908	↑	73,722	↑	35,452	↑	144,802	↑
	1980	32,000		29,700		0		61,700	
Challis NF	1981	21,000	↑	0	→	0	→	21,000	↑
	1980	0		0		0		0	
Payette NF	1981	164,837	↑	71,553	↓	64,081	↓	300,471	↑
	1980	9,400		108,800		89,400		207,600	
Salmon NF	1981	212,863	↑	28,009	↓	493	↓	241,365	↓
	1980	151,900		178,000		33,600		363,500	
Sawtooth NF	1981	8,392	↑	0	→	0	→	8,292	↑
	1980	0		0		0		0	
Targhee NF	1981	129,728	↓	61,023	↓	36,895	↓	208,646	↓
	1980	195,500		177,600		32,300		405,400	
Grand Teton NP	1981	3,845	↓	8,890	↑	1,701	↓	14,436	↑
	1980	7,200		0		2,500		9,700	
Totals	1981	740,635		347,288		172,753		1,242,296	
	1980	506,900		528,400		216,800		1,252,100	

* Arrows indicate trends; ↑ increasing, ↓ decreasing, → static

New infestations were detected on the Sawtooth and Challis National Forests. These infestations occurred northwest of Challis, in Loon Creek, and Warm Spring Creek drainages, and around Little Soldier Mountain in the River of No Return Wilderness. Budworm activity on the Sawtooth National Forest was largely concentrated in Little Smokey Creek from Couch Summit to Fleck Summit.

In eastern Idaho on the Targhee and Caribou National Forests the infestation ranged from Driggs, south throughout the Caribou Range and to the west to the Blackfoot Mountains southeast of Idaho Falls. The infestation in the Blackfoot Mountains has intensifed over the past 3 years and substantial top killing of subalpine fir has occurred. Overall defoliation in the Targhee and Caribou areas was more extensive than last year.

In northern Idaho, approximately 175 acres of aerially visible defoliation were found scattered north and northeast of Headquarters near the western edge of the Clearwater National Forest.

Douglas-fir Tussock Moth

No visible defoliation occurred in northern Idaho, however, larvae were reported on Copper Mountain west of Coeur d'Alene and in the eastern portion of the Clearwater National Forest. Approximately 160 acres of light to moderate defoliation of Douglas-fir was noted in East Fork Flint Creek and Jordan Creek areas of the Owyhee Mountains (figure 2). A single ornamental spruce in Hailey was the only other defoliation reported. This ornamental defoliation may indicate a future problem in the surrounding forested area.

Pheromone baited sticky traps were placed at all known locations of previous tussock moth outbreaks and in some potential outbreak areas throughout Idaho. In southern Idaho, 1980 trapping indicated a significant population expansion in the Dewey Peak area but spring larval populations were low in 1981 and visible defoliation did not occur. Trap analyses for 1981 in this portion of Idaho are incomplete. In northern Idaho, pheromone traps were placed at 55 locations. Male moths were caught at 31 locations; average catches per trap ranged from 0.2 to 9.6. Although these catches are still well below the threshold for potential defoliation, they show a substantial increase from 1980. The rusty tussock moth was also caught in pheromone traps. This insect only feeds on broadleaf understory vegetation resulting in insignificant impact.

Larch Casebearer

The larch casebearer is widespread throughout Idaho. This year needle diseases on western larch caused severe discoloration which made detection of casebearer defoliation difficult. One area of known heavy defoliation in northern Idaho was northwest of Bonners Ferry.

In southern Idaho defoliation greatly expanded and now affects the entire larch type on the Boise and Payette National Forests. Preliminary results of a survey of casebearer parasites in southern Idaho indicated that introduced Chrysocharis laricinellae (Ratz.) and Agathis pumila (Ratz.) are being incorporated into the casebearer population. Time is necessary for these biological control agents to reach significant population levels.

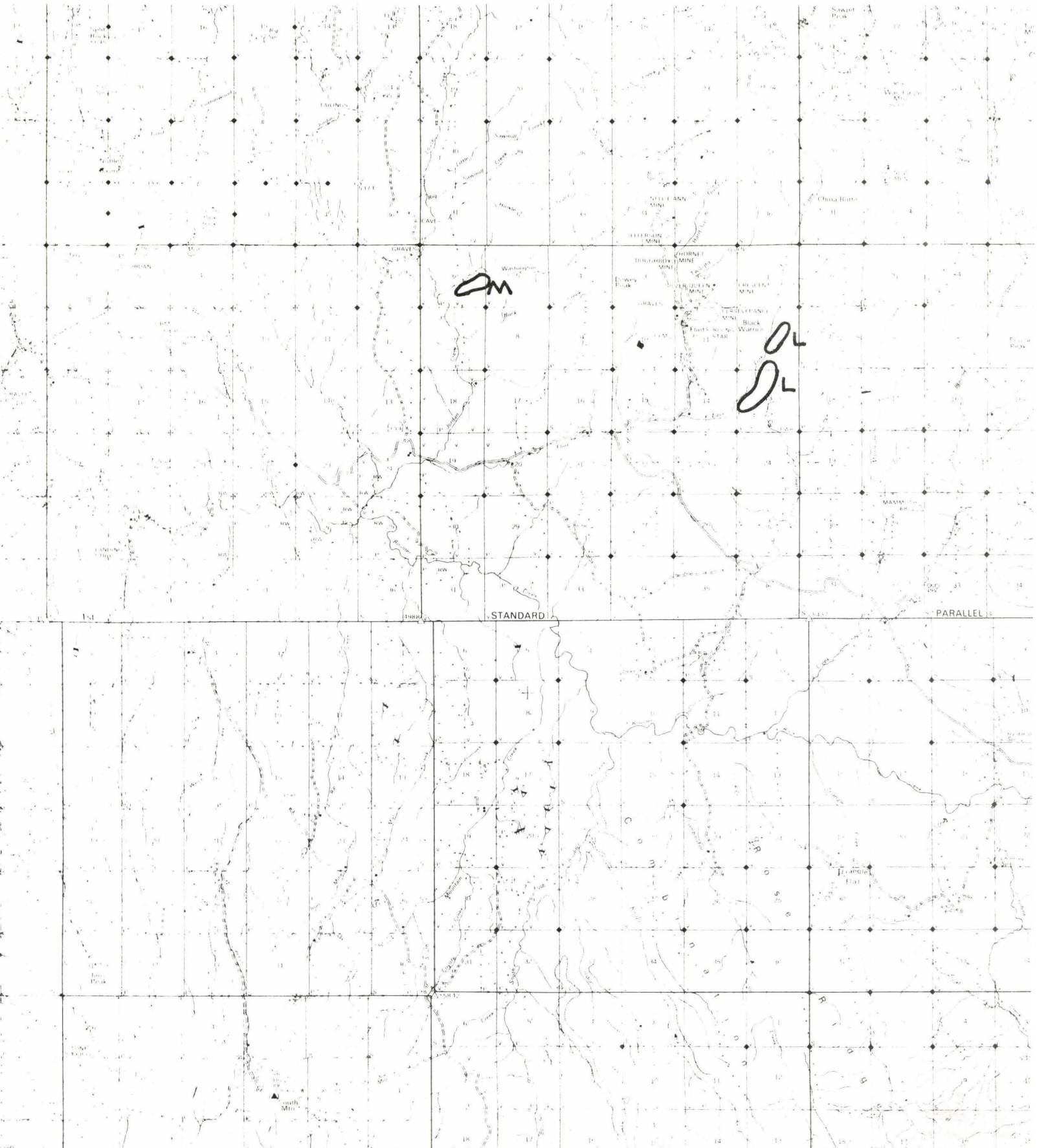

Figure 2.--Areas of Douglas-fir tussock moth defoliation visible from the air in the Owyhee Mountains of southwest Idaho-1981.

M = Moderate defoliation
L = Low defoliation

A New Budworm

A new budworm was discovered in 1978. Its taxonomy has not been completed. Defoliation increased in the Shoshone Creek drainage north of Wallace from the 40 acres initially found to over 4,500 acres during 1980. The insect prefers mountain hemlock, but also defoliates all other species of conifers in high altitude zones. Several areas defoliated in 1980 lacked damage in 1981. Due to stormy weather aerial surveys were not completed for all areas of suspected activity; therefore, some defoliation may still exist. We believe this outbreak has subsided.

Gypsy Moth

The Idaho Department of Lands placed 110 gypsy moth pheromone survey traps at 81 locations such as campgrounds, rest stops, trailer parks and other areas where tourists would likely congregate. No gypsy moths were trapped in 1981. Populations exist in Washington, Oregon and California and chances for introduction into Idaho remain high.

CONE AND SEED INSECTS

At the Sandpoint Seed Orchard a field test of permethrin insecticide was made to determine if cones on western white pine trees would be protected from beetle attacks. Permethrin was sprayed on cones at two different times at three concentrations (table 5). Protection increased as the dosage increased. A management guide is planned for protection of cones from beetles using data obtained at the Sandpoint Seed Orchard.

Table 5.--Protection of western white pine cones from cone beetle attack with applications of permethrin.

Dosage 1/	Percent Loss of Cones	
	Single application	Double application
0.25	26	13
.50	19	9
1.00	13	5
Check	78	--

1/ Given in lbs/100 gallons of water

A cone and seed insect survey was conducted in a western larch stand designated as a seed collection area southeast of Priest Lake near the North Fork of the East River. The cone crop was very low and infestation rates of cones were also very low. Insects found were principally Cecidomyiid midges.

MISCELLANEOUS INSECTS

Cranberry Girdler Moth

This moth, a sod webworm, has been a pest in the Forest Service nursery near Coeur d'Alene for the past few years. However, actual cause of the damage was not positively identified until 1981. Male moths were caught in pheromone traps placed throughout the nursery and in surrounding grass fields planted for seed crops. Webworm larvae chew bark off 2-year-old Douglas-fir seedlings below the soil line. They can also attack other conifer species. A survey to determine percentage of seedlings injured is planned for 1982. Field tests to control the insect with chemicals may be necessary if populations are high and damage significant.

Western Pine Shoot Borer

The western pine shoot borer caused substantial damage throughout ponderosa pine stands of Idaho. Management techniques are being formulated. A survey was conducted during 1980 to measure intensity of shoot borer infestations in three ponderosa pine progeny testing plantations in northern Idaho. These were the Lone Mountain, Tensed and Grangeville plantations. Natural resistance that might be exhibited by any of the seed sources is being examined.

A study of stand susceptibility in central and southern Idaho is being completed by the University of Idaho. Results of this study should provide us with a stand risk rating system for this pest.

Forest Tent Caterpillar

This insect caused light to moderate defoliation to approximately 35 acres of scattered aspen in heavily used recreational areas west of Cascade Reservoir. As expected, the trees refoliated after insect feeding ended in mid-July. Infestations are usually short lived, and significant tree damage does not usually occur.

Sugar Pine Tortrix

This insect fed on the new foliage of scattered sapling and pole-sized lodgepole and ponderosa pine in the Payette, Salmon, and Sawtooth National Forests.

Pine Butterfly

Late this summer numerous white butterflies (figure 3) were noted in many ponderosa pine stands on the Boise and Payette National Forests. Although these flights indicate a widespread infestation, moderate defoliation was found in one limited area around Dry Buck Summit on the Boise National Forest. Viable egg masses are being recovered from ponderosa pine stands on the Boise National Forest around Lowman, Idaho City, Banks, and east of Cascade.

Figure 3.--Pine butterfly adult which infests ponderosa pine.

Ponderosa Pine Needle Miner

Approximately 1,900 acres of ponderosa pine on the Salmon National Forest were defoliated by this moth. Activity was centered in the Wagonhammer and Silverlead Creek drainages and in two areas around Gibbonsville. Infestations noted last year on the Boise and Payette National Forests were not monitored this year. Defoliation is usually of short duration.

Lodgepole Needle Tier

Small lepidopterous caterpillars matching the morphological description and habits of the lodgepole needle tier were found infesting white pine seedlings in one greenhouse of the Coeur d'Alene Nursery. There was very little damage and control was obtained by hand picking the caterpillars.

Mites

A population of unidentified mites was found causing substantial damage in a Scotch pine Christmas tree plantation north of Horseshoe Bend. The damage included chlorosis of needles and loss of older needles.

White Grubs

A plantation of lodgepole pine seedlings at the Priest River Experimental Forest has suffered low but continuing losses for the past several years. Several white grub larvae were found in the area and may be the principal cause of the damage.

Grand Fir Tip Insect

A small beetle was found infesting new growing tips of grand fir. Feeding of the larvae hollows out and kills the new stem. In a detection survey the insects were found from Kooskia to Spirit Lake north of Coeur d'Alene. Impact of the insect is currently unknown.

DISEASES

FOLIAGE DISEASES

Frost Damage

Freezing temperatures during the first week in July affected young succulent tissues of several conifer species throughout south-central Idaho. Newly emerged leaders of Douglas-fir and lodgepole pine were killed or distorted (figure 4), while true firs suffered only minor damage. Resulting branch tip mortality of Douglas-fir closely resembled symptoms associated with western spruce budworm damage which complicated aerial detection surveys.

Figure 4.--Severe frost damage on Douglas-fir in southern Idaho.

Larch Foliage Diseases

Foliage diseases of western larch were severe throughout its entire range in Idaho. Therefore, aerial surveys were not conducted nor were disease incidence maps prepared. During early spring Hypodermella needle cast appeared in northern Idaho. This disease is recognized by the persistent drooping dead needles with black fruiting bodies. In southern Idaho, early spring discoloration of western larch was caused by larch casebearer. Later in the spring and summer, Meria needle cast became prominent. This disease causes a mottling of needles which eventually turn red. Damage is most severe in the lower crown; small trees are often completely defoliated. Severe infection of young regeneration resulted in scattered tree mortality on the Idaho Panhandle and Clearwater National Forests in northern Idaho and near Garden Valley in southern Idaho. High inoculum levels may result in continued damage for the next few years; spring weather conditions will affect infection levels.

Red Band Needle Blight

Red band needle blight has been observed periodically within portions of the Clearwater National Forest along the Lochsa River. Damage was especially prominent during 1981 on ponderoa pine within and adjacent to the Wilderness Gateway Campground (figure 5). Western white pine and lodgepole pine were lightly infected. The disease was also identified on ponderosa pine in the Garden Valley area east of Banks; this is the first report of the disease in southern Idaho. Outbreaks were likely associated with extended periods of cool, wet weather during the spring when infections occurred.

Lophodermium Needle Cast

In the early spring of 1981 Lophodermium needle cast was discovered for the first time on Scotch pine Christmas trees near Sandpoint (figure 6). Subsequent surveys indicated that the disease was in two other nearby plantations owned by the same individual. Several large commercial growers in Oregon and Washington have sharply curtailed Scotch pine Christmas tree production because of this disease. Although the disease can be controlled by a series of monthly fungicide applications, such procedures are expensive. Inoculum levels monitored by spore trapping will dictate need for control. Surveys have been initiated in several heavily infected plantations.

Miscellaneous Foliage Diseases

Rhabdocline needle cast on Douglas-fir, while still very evident during 1981, was of decreased incidence in southern Idaho. The unusual discoloration of interior needles observed last year on Douglas-fir near Cascade, Idaho was not repeated this year. This discoloration was probably not related to the pathogen but to adverse weather conditions.

Figure 5.--Red band needle blight of ponderosa pine on the Clearwater National Forest.

Figure 6.--Scotch pine Christmas tree plantation with severe infection with Lophodermium needle cast.

Moderate to heavy levels of Elytroderma needle cast of ponderosa pine and occasionally lodgepole pine were observed in west-central Idaho. Infected trees exhibit a light orange cast throughout the crown during early spring and midsummer. Long, black fruiting structures become noticeable on newly infected needles late in the summer. Witches' brooms are often found on trees with perennial infections.

Greybeard needle disease of ponderosa pine was locally heavy in and around the Boise and Payette National Forests. Initially infected needles are red; they droop down but remain attached to twigs and turn grey the following year.

Lodgepole pine needle cast was identified in several locations on the Idaho Panhandle and Clearwater National Forests in northern Idaho and within several drainages around Tamarack in southern Idaho. This disease causes reddening of the previous year's needles. Near Smith's Ferry only an occasional tree was infected.

Snow blight was infrequently observed on Douglas-fir on the Ashton Ranger District (Targhee National Forest) in southwestern Idaho. True fir needle cast and needle rust occurred throughout southwestern Idaho; several areas had heavy infection levels. Broom rusts of true fir and Engelmann spruce are common throughout the State. Systemic infections result in yellow brooms but effects on trees are usually minimal.

Several hardwood foliage diseases were common during the year. Marssonina leaf spot of poplars was observed during spring and summer throughout southern Idaho. Clonal variation of infection was common. Leaf rust of poplars occurred throughout portions of southwestern Idaho. Heavy infection causes early leaf drop and may lead to growth reduction and predispostion to winter mortality or infection by other pathogens. Mountain maple in the Trail Creek area near New Meadows, Idaho was heavily infected with leaf spot. Spots appeared as yellow-brown circular lesions scattered on infected leaves.

ROOT DISEASES

Root diseases are probably the most important long-term disease problems in Idaho forests. Root disease-bark beetle complexes account for significant annual mortality in mixed conifer stands throughout the State. Laminated root rot and Armillaria root disease are commonly associated with attacks by Douglas-fir beetle on Douglas-fir and fir engraver on grand fir. Black stain root disease of ponderosa pine is often associated with western pine beetle attacks.

Losses are especially severe in Douglas-fir and grand fir stands which have a previous logging history. Although several fungi can cause root diseases, crown symptoms often appear quite similar regardless of the pathogen(s) present. On some trees, basal symptoms, such as heavy pitch flow and rusty-brown staining occur before crown symptoms become apparent. Identification of root pathogens and associated insects is important in making sound management prescriptions.

In northern Idaho, laminated root rot of Douglas-fir and grand fir causes very large disease centers which often become brush fields. Annosus root disease was associated with increasing frequency on ponderosa pine, Douglas-fir, and true fir in southwestern Idaho. Tomentosus root rot and brown cubical root rot are often associated with beetle-killed Douglas-fir.

Root disease surveys have recently been completed for the Nezperce National Forest in northern Idaho. Large scale color infrared photographs were used to locate suspected root disease centers for subsequent ground checking. Results indicate that at least 10,000 acres (1 percent) of the commercial forest land on the Nezperce National Forest are occupied by large, active root disease centers. This conservative figure may significantly underestimate the actual area of root disease infection; recent research indicates that area of root disease infection is at least twice as large as can be detected from above-ground crown symptoms. Tree mortality and volume estimates (table 6) indicate that root diseases account for severe losses on this Forest.

Table 6.--Root disease mortality and cubic foot volume losses on the Nezperce National Forest, Idaho.

	Nezperce National Forest	
Mortality category 1/	Number of trees	Volume (mm cu. ft.)
Current root disease	761,712	29.1
Older root disease	11,505,739	128.9
Total root disease	12,267,451	158.0
Other mortality	21,760,519	457.4
Total mortality	34,027,970	615.4

1/ Based on crown symptoms and mortality patterns discernable from large scale aerial photographs.

A total of 111 permanent plots have been established by the Idaho Department of Lands in 17 active root disease centers in northern Idaho to monitor progression of symptoms on infected trees. In one root disease area, 7 of 33 symptomatic trees died within 6 months; 13 of the remaining 26 trees exhibited an increase in basal or crown symptoms.

Douglas-fir group mortality on the Boise and Payette National Forests remained at a low level except along the Middle Fork Boise River and Adams/Monroe Creek, where approximately 800 and 500 trees were killed, respectively. Bark beetles, dwarf mistletoe and root disease were all involved with the mortality.

DWARF MISTLETOES

Dwarf mistletoes are common on conifers throughout Idaho. Ponderosa pine, lodgepole pine, western larch,and Douglas-fir are most seriously affected. Impact surveys have been completed for southern Idaho; results have been summarized in previous conditions reports. Dwarf mistletoe loss assessment surveys were initiated in northern Idaho in 1981. Based on a sample of 643 trees on the Clearwater National Forest, less than 1 percent of the Douglas-fir, 54.5 percent of the western larch, and 8.4 percent of the lodgepole were dwarf mistletoe-infested. Estimates of growth loss caused by dwarf mistletoes in northern Idaho are summarized in table 7.

The Idaho Department of Lands has established more than 450 plots in several infected stands near Banks, Council, and Idaho City to evaluate success of various management activities in reducing losses.

Although silvicultural treatments can effectively control this disease, there are still many areas in need of treatment.

WHITE PINE BLISTER RUST

White pine blister rust causes severe losses throughout the range of western white pine in Idaho. The rust resistance breeding program continues to improve with more white pine seed collected each year from disease resistant seed orchards. New seed orchards were established during 1981 at Sandpoint, Bonners Ferry, and several other locations to increase seed production and replace older seed orchards.

Research has indicated that the risk of rust infection varies with site conditions; in some low risk areas, naturally susceptible white pine can be grown successfully. Techniques for risk rating individual stands are being refined.

STEM CANKERS

Most stem cankers are slow growing; rapid changes in disease intensity and distribution are not often observed. Any changes in stem canker activities are usually more noticeable in young trees.

Table 7.--Growth loss caused by dwarf mistletoe in northern Idaho.

National Forest	Species	Commercial forest (M acres)	Infested %	Infested M acres	Growth loss ft^3/ac/yr	Volume loss M ft^3/yr	Total volume loss M ft^3
Idaho a/ Panhandle	Douglas-fir	376.2	30.3	114.0	20	2,280	
	Western larch	461.2	29.8	137.5	20	2,750	
	Lodgepole pine	155.9	26.9	41.9	12	503	5,533
Clearwater b/	Douglas-fir	286.6	0.3	0.83	20	17	
	Western larch	16.3	54.5	8.88	20	178	
	Lodgepole pine	197.4	8.4	16.35	12	196	391
Nezperce a/	Douglas-fir	239.5	30.3	72.6	20	1,452	
	Western larch	12.1	29.8	3.6	20	72	
	Lodgepole pine	265.1	26.9	71.3	12	856	2,380
	Total						8,304

a/ Based on assumed similarities with western Montana.

b/ Preliminary data from loss assessment survey, 1981.

Atropellis Canker

Atropellis cankers are common in many lodgepole pine stands in northern Idaho. The disease was also identified in several new locations in southern Idaho including the Grant Creek area near Krassel, the Tripod Creek area west of Smith's Ferry, and the Thorn Creek area near McCall. Atropellis cankers can be identified by black staining of the wood underneath flattened cankers.

Dasyscypha Canker

Stems of the 4- to 6-year-old lodgepole pine in several plantations in the Island Park area (Targhee National Forest) in southeastern Idaho were girdled by Dasyscypha cankers. The fungus produces small cup-shaped fruiting bodies with cinnamon-colored edges and orange centers. These fruiting bodies are frequently found on active canker margins.

Cytospora Canker

Cytospora cankers were identified on ornamental aspen in the Wood River zone of the Sawtooth National Recreation Area. These cankers usually occur on stressed or wounded trees. Cankers are orange-brown, sunken, and covered with tiny, pimple-like spore structures.

DECAYS

Decay is especially common in old growth stands and causes significant timber volume losses. Severely decayed trees pose potential hazards in high use recreation areas such as campgrounds.

The Idaho State Parks Department has established a program to identify and remove hazardous trees within their recreation areas. Several campsites in their Priest Lake campground have a high incidence of severely decayed grand fir and hemlock. Over 100 of these potentially hazard trees were tagged, examined for decay with increment core samples, and given a relative risk rating during 1980-1981. In the fall of 1981, a sample of these trees was remeasured for extent of decay; 65 percent of the remeasured trees showed an increase in decay over a 1-year period. This information will help park managers selectively remove highest risk trees and provide some basic decay rate information.

NURSERY DISEASES

Sirococcus Tip Blight

Sirococcus tip blight, discovered last year on 1-0 ponderosa pine seedlings in two private nurseries near Bonners Ferry, continued to cause losses in 1981. Estimated losses over 2 years were more than 20,000 seedlings (16-20 percent of the stock). Most damage occurred on newly germinated pine where up to 50 percent of the seedlings were infected. Losses were high in spite of biweekly applications of chlorothalonil. Ineffectiveness of the spray program was attributed to prolonged spring rains and overhead irrigation which may have washed the fungicide from plants. Changes in irrigation schedules are planned; losses for next year will depend on intensity and duration of spring rains.

Pythium Root Disease

Recent mortality of 2-0 Douglas-fir and grand fir seedlings at the Coeur d'Alene Nursery was found to be due to Pythium root disease. Affected trees were grouped at the end of several seedbeds which had been flooded with water prior to symptom development. This disease is usually of no consequence in well-drained fumigated seedbeds. However, significant losses can occur when tree roots are submerged in standing water for a few days.

Grey Mold

Several fungicides were tested to evaluate their ability to control grey mold of containerized western larch and lodgepole pine seedlings at the Coeur d'Alene Nursery. The most effective fungicides were iprodione (Chipco®) and chlorothalonil (Bravo® and Daconil®); benomyl (Tersan®) and dichloran (Botran®) were generally ineffective in controlling the disease. Similar tests are planned for western larch seedbeds next year.

This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

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APPENDIX

MAJOR INSECT DAMAGE IN IDAHO, 1981

Green portions of the adjoining maps are National Forest land; white is State, private, and other Federal with major blocks of State ownership outlined with a heavy dark line. Keys to trees killed in designated map areas are included in the next few pages.

FIR ENGRAVER ATTACKS, 1981

Map Designation	No. Dead Trees	Map Designation	No. Dead Trees
1	50	13	250
2	50	14	100
3	75	15	375
4	80	16	60
5	50	17	45
6	50	18	85
7	50	19	85
8	30	20	75
9	65	21	70
10	25	22	80
11	30	23	110
12	225	24	35

DOUGLAS-FIR BEETLE ATTACKS, 1981

Map Designation	No. Dead Trees	Map Designation	No. Dead Trees
A	60	K	35
B	35	L	125
C	55	M	95
D	240	N	115
E	85	O	110
F	90	P	725
G	45	Q	55
H	570	R	440
I	60	S	120
J	1,175		

PINE ENGRAVER ATTACKS, 1981

Map Designation	No. Dead Trees
1	85
2	135
3	600
4	135
5	125
6	125
7	75

MOUNTAIN PINE BEETLE ATTACKS, 1981

Map Designation		No. Dead Trees
NORTH IDAHO		
Coeur d'Alene River	WWP	105
Monument Mountain	WWP	30
Latour Creek	LPP	1,200
Soldier's Meadows Reservoir	LPP	55,000
Dog Creek Point	PP	410
Newsome	LPP	315
Silver Creek	PB	35
Elk City	LPP	1,775
Little Mallard Creek	PP	40
SOUTHWEST IDAHO		
Lick Creek	LPP	300
Meadows	LPP	490
McCall	LPP and PP	1,000
N.Fk. Payette River	LPP	3,885
Kennally Creek	LPP	22,885
Pyramid Pt.-Cuddy Mtn.	LPP	875
East Mtn.	LPP	2,000
Smith's Ferry	LPP and PP	620
Deadwood Reservoir	LPP	755
EASTERN IDAHO		
Inland Park Area	LPP	707,100
Mt. Manning	LPP	2,170
Victor	LPP	100
Caribou Mtn.	LPP	3,530
Big Elk Mtn.	LPP	200
McCay Creek	LPP	100
Tincup Mtn.	LPP	550
S.Fk. Tincup Creek	LPP	100
Wayan	LPP	150

FIR ENGRAVER BEETLE
WESTERN SPRUCE BUDWORM
SPRUCE BEETLE
1981

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

Datum is mean sea level

Compiled, edited, and published by the Geological Survey
North American datum
Lambert conformal conic projection, standard parallels 33° and 45°

LEGEND

SOURCE DATA

BASE MAP

INFORMATION AGENCY

BOISE	State Hwy Dept. 25 000
TWIN FALLS	U.S.G.S. 25 000
KETCHUM	U.S.G.S. 10 000
Shoshone	U.S.G.S. 1 000
Various	U.S.G.S. 1 000

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D.C. 20242
COMPILED IN 1964
EDITION OF 1968

DOUGLAS-FIR BEETLE
MOUNTAIN PINE BEETLE
PINE ENGRAVER BEETLE
1981

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

Datum is mean sea level

LEGEND

SOURCE OF DATA

POPULATION KEY

BOISE — more than 25,000
TWIN FALLS — 12,000 to 25,000
Rathdrum — 2,500 to 12,000
Smelterville — 1,000 to 2,500
Worley — less than 1,000

BASE MAP

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COMPILED IN 1984
EDITION OF 1984

CANADA
NEVADA
UTAH
OREGON
WYOMING
WASHINGTON
BONNER
BOUNDARY
KOOTENAI
SHOSHONE
BENEWAH
LATAH
CLEARWATER
NEZ PERCE
LEWIS
IDAHO
ADAMS
VALLEY
WASHINGTON
PAYETTE
GEM
BOISE
CANYON
ELMORE
CAMAS
BLAINE
GOODING
LINCOLN
JEROME
MINIDOKA
TWIN FALLS
CASSIA
POWER
BANNOCK
ONEIDA
FRANKLIN
BEAR LAKE
CARIBOU
BINGHAM
BUTTE
CLARK
FREMONT
JEFFERSON
MADISON
TETON
BONNEVILLE
IDAHO FALLS
POCATELLO
Mountain Home
Coeur d'Alene
Lewiston
Moscow
Sandpoint
Kellogg
Wallace
Grangeville
Salmon
Challis
Stanley
Ketchum
Hailey
Twin Falls
Rupert
Burley
Preston
St Anthony
Rexburg
Driggs
Montpelier
Soda Springs
Malad City
Weiser
Payette
Emmett
Nampa
Caldwell
Boise
Middle Fork Salmon River
Salmon River Mountains
Lemhi Range
Lost River Range
Big Lost River Range
Pioneer Mountains
Sawtooth Mountains
Boise Ridge
Bitterroot Range
Clearwater Mountains
Big Creek Peaks
Selway-Bitterroot Wilderness
Frank Church-River of No Return Wilderness
Sawtooth Wilderness
Craters of the Moon Wilderness
Grand Teton National Park
Yellowstone National Park
Targhee National Forest
Caribou National Forest
Sawtooth National Forest
Boise National Forest
Payette National Forest
Nez Perce National Forest
Clearwater National Forest
Kaniksu National Forest
Coeur d'Alene National Forest
St. Joe National Forest
Idaho Panhandle National Forests
Bitterroot National Forest
Salmon National Forest
Challis National Forest
Sawtooth National Recreation Area
Big Camas Prairie
Camas Prairie
Snake River Plain
Palisades Reservoir
Island Park Reservoir
Grand Teton National Park
Yellowstone National Park
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INDEX OF INSECTS AND DISEASES

Common Name	Scientific Name	Page
INSECTS		
Cranberry girdler moth	Chrysoteuchia topiaria Zeller. . .	
Douglas-fir beetle	Dendroctonus pseudotsugae Hopk. .	
Douglas-fir tussock moth	Orgyia pseudotsugata McDunnough. .	
Forest tent caterpillar	Malacosma disstria Hubner	
Fir engraver	Scolytus ventralis LeConte	
Gypsy moth	Lymantria dispar (L.).	
Larch aphid	Adelges lariciatus (Patch) Adelges (=Strombilobius) laricis (Kattenbach) Vallot	
Larch casebearer	Coleophora laricella (Hub.). . . .	
Lodgepole needle tier	Unidentified lepidoptera	
Mountain pine beetle	Dendroctonus ponderosae Hopk. . .	
New budworm	Argyrotaenia sp. near gogana (Kearfott)	
Pine butterfly	Neophasia menapia (Felder and Felder).	
Pine engraver	Ips pini (Say)	
Ponderosa pine needle miner	Coleotechnites sp.	
Rusty tussock moth	Orayia antigua (L.)	
Spruce beetle	Dendroctonus rufipennis (Kirby) .	
Sugar pine tortrix	Choristoneura lambertiana (Busck.)	
Western balsam bark beetle	Dryocoetes confusus Swaine	
Western pine beetle	Dendroctonus brevicomis LeConte. .	
Western pine shoot borer	Eucosma sonomana Kearfott.	
Western spruce budworm	Choristoneura occidentalis Freeman	
White grubs	Phyllophaga anxia (LeConte) . . .	

Common Name	Scientific Name	Page
DISEASES		
Annosus root disease	Fomes annosus Fr. Cke. . . . . (=Heterobasidion annosum (Fr.) Bref.)	
Armillaria root disease	Armillaria mellea (Vahl. ex Fr.) . . .	
Atropellis canker	Atropellis piniphila (Weir) Lohman and Cush.	
Black stain root disease	Verticicladiella wagenerii Kend. . . .	
Brown cubical butt rot	Phaeolus schweinitzii (Fr.,) Pat. . .	
Christmas tree blight	Rhabdocline psedutosugae Syd.	
Cytospora canker	Cytospora chrysosperma Pars. ex Fr. .	
Dasyscypha canker	Dasyscypha sp.	
Dwarf mistletoes	Arceuthobium spp.	
Elytroderma needle disease	Elytroderma deformans (Weir) Darker. .	
Fir broom rust	Melampsorella caryophyllacearum Schroet.	
Fir needle cast	Lirula abietis-concoloris (Mayr) Darker	
Fir needle rust	Pucciniastrum spp.	
Greybeard needle disease	Lophodermium spp.	
Grey mold	Botrytis cinerea Pers. ex Fr.	
Laminated root rot	Phellinus weirii (Murr.) Gilb.	
Lodgepole pine needle cast	Lophodermella concolor (Dearn.) Darker	
Lophodermium needle cast	Lophodermium seditiosum, Minter, Staley, Miller (=L. pinastri (Schrad. ex Hook.) Chev.)	

Common Name	Scientific Name	Page
DISEASES (continued)		
Maple leaf spot	Septoria aceris (Lib.) Berk. and Br. .	
Marssonina leaf spot	Marssonina populi (Lib.) Magn.	
Meria needle disease	Meria laricis Vuill.	
Pine needle rust	Coleosporium asterum (Diet.) Syd. . .	
Poplar leaf rust	Melampsora spp.	
Pythium root disease	Pythium ultimum Trow. . . . . Pythium aphanidermatum (Eds.) Fitz. .	
Red band needle blight	Scirrhia pini (Funk and A. K. Parker)	
Sirococcus tip blight	Sirococcus strobilinus Preuss. . . .	
Snow blight	Phacidum infestans Karst.	
Spruce broom rust	Chrysomyxa arctostaphyli Diet.	
Tomentosus root rot	Polyporus tomentosus Fr.	
White pine blister rust	Cronartium ribicola Fisch.	